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| EXAMINER | |
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| CARLOS, ALVIN LEABRES | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/594,452 | BJORKMAN ET AL. | |
| | Examiner | Art Unit | |
| | ALVIN L. CARLOS | 3715 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 July 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. The following is a Final Office action in response to communications received September 23, 2009. Claims 1, 4, 6-7, 9, 11, 17, 22 and 24-27 have been amended. Claims 1-27 are now pending.

### *Response to Amendment*

2. Applicant's amendment to claim 9 is sufficient to overcome the objection set forth from the previous office action.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-27 stand rejected under 35 U.S.C. 102(b) as being anticipated by Varshneya 6386879.

Re claim 1, Varshneya discloses a weapon effect simulation system (see figures 1A-1B, column 1 lines 5-8), comprising a weapon 12 comprising a fire simulation system comprising a transmitter configured to transmit electromagnetic waves from a weapon to simulate real ammunition from the weapon and the transmitter including information in the electromagnetic waves (see figure 1B, column 2 lines 55-59), and a calculating unit configured to calculate an imagined trajectory of the simulated ammunition and a processor configured to determine a geographical position of the weapon, and transmitter is operative to include in the electromagnetic waves

information related to coordinates in the three-dimensional space for the calculated ammunition trajectory (see figures 1A-B, column 2 lines 13-20), and at least one target comprising a hit simulation system comprising a receiver configured to receive the transmitted electromagnetic waves (see figures 1A-B, column 2 lines 40-45, column 3 lines 63-67 and column 4 lines 1-57), and a processor configured to determine whether a target has been hit based on the information related to coordinates in the three-dimensional space for the calculated ammunition trajectory in the received electromagnetic waves (see figures 1A-B, column 4 lines 58-67 and column 5 lines 1-10).

Re claim 2, Varshneya discloses the transmitter comprising a laser transmitter 28 operative to transmit laser radiation with at least one beam lobe (see figure 1B, column 2 lines 55-62).

Re claim 3, Varshneya discloses the transmitter comprising a radio transmitter operative to transmit radio waves (column 3 lines 4-14).

Re claim 4, Varshneya discloses the processor is operative to determine target hits based primarily on the information in the laser radiation and secondarily on the information in the radio waves (column 2 lines 55-67 and column 3 lines 1-14).

Re claim 5, Varshneya discloses transmitter comprising a radio transmitter operative to transmit radio waves (column 3 lines 4-14).

Re claim 6, Varshneya discloses the transmitter is operative to continuously include, based on the calculated trajectory, information concerning the current trajectory position of the simulated ammunition (column 3 lines 15-24).

Re claim 7, Varshneya discloses the processor is operative to including information concerning the trajectory positions of the simulated ammunition during a period of time that is shorter than the flight time of the real ammunition and based on the calculated trajectory (column 4 lines 32-57).

Re claim 8, Varshneya discloses the calculating unit is operative to determine an impact point or burst point of the ammunition, and the information related to the calculated ammunition trajectory contains the impact point or burst point (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 9, Varshneya discloses the fire simulation system comprising a transmitter operative to transmit information regarding the geographical position of the weapon, and at least one of the target comprising a hit simulation systems comprising a receiver operative to receive said position data (column 2 lines 55-67 and column 3 lines 1-14).

Re claim 10, Varshneya discloses the information related to the calculated ammunition trajectory is determined relative to the geographical position of the weapon (column 2 lines 55-67 and column 3 lines 1-14).

Re claim 11, Varshneya discloses hit simulation system comprising a processor configured to determine the geographical position of the target (column 4 lines 16-31).

Re claim 12, Varshneya discloses at least one of the targets comprising a hit system comprising a transmitter, and wherein the fire simulation system comprises a receiver operative to receive information from the transmitter of the hit simulation system (column 2 lines 55-67 and column 3 lines 1-14).

Re claim 13, Varshneya discloses the transmitter of the hit simulation system is operative to transmit information regarding the geographical position of the target (column 4 lines 43-47).

Re claim 14, Varshneya discloses the calculating unit is operative to determine which target has been hit, and information related to the calculated ammunition trajectory includes information that identifies the determined target (column 4 lines 32-57).

Re claim 15, Varshneya discloses the transmitter of the hit simulation system is operative to transmit a hit message upon determination of a hit (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 16, Varshneya discloses a receiver for a hit simulation system that has not determined a hit act as a secondary object and is operative to receive the transmitted hit message (column 5 lines 3-10).

Re claim 17, Varshneya discloses the processor is operative to decide upon receiving hit messages whether the secondary object has been hit (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 18, Varshneya discloses the transmitter is operatively connected with the receiver of the fire simulation system and is operative to break off the simulation upon receiving the hit message (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 19, Varshneya discloses the fire simulation system comprising a display configured to display hit locations and effects based on received hit messages (column 5 lines 6-10).

Re claim 20, Varshneya discloses the display is operative to display hit locations and effects visually (column 5 lines 6-10).

Re claim 21, Varshneya discloses the fire simulation system is disposed at a weapon (see figure 1A, column 2 lines 57-59).

Re claim 22, Varshneya discloses the processor has a geographical position that is separate from the geographical position of the transmitter (column 2 lines 55-67 and column 3 lines 1-4).

Re claim 23, Varshneya discloses hit simulation system is disposed in connection with a respective target (see figure 1A, column 4 lines 16-31).

Re claim 24, Varshneya discloses the processor is operative to determine a hit location on the target (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 25, Varshneya discloses wherein the processor is operatively connected with the transmitter of the fire simulation system and operative to break off the simulation if a hit is determined corresponding to damage or injury that renders continued firing impossible (column 4 lines 32-67 and column 5 lines 1-10).

Re claim 26, Varshneya discloses a fire simulation system for weapon effect simulation systems (column 2 lines 3-20), comprising a transmitter arranged with the weapon and configured to transmit electromagnetic waves for simulating ammunition from a weapon and for including information in the electromagnetic waves operative to include information related to coordinates in the three-dimensional space for the calculated ammunition trajectory (see figure 1B, column 2 lines 55-65), a calculating unit arranged with the weapon and configured to calculate the imagined trajectory of the

ammunition (see figures 1A-B, column 2 lines 13-20, column 3 lines 63-67 and column 4 lines 1-57), and a processor arranged with the weapon and configured to determine the geographical position of the weapon (column 4 lines 58-67 and column 5 lines 1-10).

Re claim 27, Varshneya discloses a method for simulating the effect of a weapon on one or more potential targets (column 1 lines1-4), comprising calculating with the weapon the imagined trajectory of the simulated ammunition (see figures 1A-B, column 2 lines 13-20), modulating with information electromagnetic waves for simulating ammunition from the weapon (column 2 lines 3-6), information related to coordinates in the three-dimensional space for the calculated ammunition trajectory (column 2 lines 55-67 and column 3 lines 1-4), transmitting from the weapon the modulated electromagnetic waves for reception by the potential targets (column 4 lines 16-31), making a determination with the targets upon reception of the electromagnetic waves for each respective target as to whether the target has been hit, based on the information related to coordinates in the three-dimensional space for the calculated ammunition trajectory in the received electromagnetic waves (column 4 lines 32-67 and column 5 lines 1-10).

***Response to Arguments***

5. Applicant's arguments filed September 23, 2009 have been fully considered but they are not persuasive.

6. In response to applicant's arguments that Varshneya does not disclose "a system that includes a fire simulation system that calculates an imagined trajectory of the

simulated ammunition includes information in electromagnetic waves information related to coordinates in three-dimensional space for the calculated ammunition trajectory, and at least one target comprising a hit simulation system comprising a receiver configured to receive the transmitted electromagnetic waves from the weapon and a processor configured to determine whether a target has been hit based on the information related to coordinates in the three-dimensional space for the calculated ammunition trajectory in the received electromagnetic waves", the Examiner disagrees.

Claim 1 recites "A weapon effect simulation system, comprising: a weapon comprising a fire simulation system comprising a transmitter configured to transmit electromagnetic waves from a weapon to simulate real ammunition from the weapon, and the transmitter including information in the electromagnetic waves, the fire simulation system further comprising a calculating unit configured to calculate an imagined trajectory of the simulated ammunition and a processor configured to determine a geographical position of the weapon, transmitter is operative to include in the electromagnetic waves information related to coordinates in the three-dimensional space for the calculated ammunition trajectory; and at least one target comprising a hit simulation system comprising a receiver configured to receive the transmitted electromagnetic waves from the weapon and a processor configured to determine whether a target has been hit based on the information related to coordinates in the three-dimensional space for the calculated ammunition trajectory in the received electromagnetic waves".

Varshneya discloses a gunnery simulation system that provide a more precise gunnery training system that takes advantage of GPS locators and has improved capabilities and flexibilities to further enhance the realism of the tank gunnery training exercise in complex tactical situations. In addition, Varshneya positively discloses "the ballistic simulation is run at the target tank 14 and DGPS is used for target tracking. The use of an RF data link and GPS leads to much lower cost than prior art gunnery simulator systems. The system can be used in either in fire and forget or tracking modes. Its hit/miss accuracy is improved over that of prior gunnery simulation systems because of a faster scan rate and because DGPS tracking of the target tank 14 is independent of shot fly-out time. The system can be used to train in normal, degraded, manual and emergency modes. The user follows the same operational steps involved in firing on a tank with a live round in a combat situation. The system and method accommodate multiple shooters and multiple targets. The range to target generates gun super EL offset. The target is tracked to generate gun lead offset. The system is capable of determining the impact point (or miss perigee) with respect to the center of mass of the target tank. A weapon fly-out tracer is displayed to the shooter and provides immediate feedback. Realistic Pk and casualty assessment are performed. The system and method disseminate engagement results in near real time. Engagement exercises can be recorded to support diagnostic AAR. Shooters and targets are unambiguously paired" (column 5 lines 23-45). Furthermore, Varshneya discloses a gunnery simulation system that utilizes GPS and DGPS that determines a range to the target by comparing a set of GPS coordinates of the gun and the target. Based on the target azimuth, the

target elevation, the range to the target and the time of the trigger pull the system control unit computes an impact point relative to the target of a simulated ballistic shell fired from the gun at the time of the trigger pull (see figures 1A-1B, column 2 lines 2-20).

Furthermore, Varshneya discloses the gunner's primary sight 60 (FIG. 2) has a lens assembly 62 and tracer overlay 64 that communicates with the system control unit 42 via tracer overlay drive circuit 66. A first array 68 of optical sensors is spaced around the tank turret 16. A second array 70 of optical sensors is spaced around the tank hull 32. The arrays 68 and 70 may include lenses and protective covers 68a, 68b and 70a, 70b, respectively. Each of the arrays is made of individual laser detectors that generate signals and transmit them to the system control unit when struck by the laser beam from the laser scanner transmitter 28 of an opposing tank. As shown in FIG. 1, the detectors of the arrays 68 and 70 are spaced about the turret and hull so that they can detect a laser scan or simulated laser projectile from all angles likely to be encountered. A turret orientation sensor 72 (such as an optical encoder), inertial unit 74 and hull orientation sensor 76 all feed data signal the system control unit 42. A target only module 78, a shooter only module 80, a shooter and target module 82 and an external system module 84 may optionally be connected to the system control unit 42. Before trigger pull the shooter performs ranging and tracking functions. This is achieved by optically scanning the target tank 14. The field of view (FOV) of the shooter is large enough to include all types of ammo that can be fired by the tank 10. The laser scanner transmitter 28 of the shooter tank 10 periodically transmits optical data to the target tank 14 during a scan. The target tankl4 decodes the optical data, encodes its DGPS position, its ID,

the shooter ID, the optical azimuth and elevation and broadcasts an RF message to the shooter tank 10. The RF message is processed by the shooter tank 10 so long as its ID matches with the returned message, it being understood that our system allows more than two tanks to engage each other simultaneously. Target aiming and tracking are then carried out in the conventional fashion by the FCC 44 and this generates the required gun lead. At trigger pull the shooter/target geometry is determined by a combination of direct optical measurements via the shooter laser scanner transmitter 28, DGPS and optical/RF data links. At trigger pull (TP),the laser scanner transmitter 28 is used to measure the target azimuth (AZ) and super elevation (EL) with respect to the shooter's boresight. Scan duration is much faster than the shot fly-out time (fast enough to prevent overall accuracy degradation). Further details of scanning techniques are disclosed in U.S. Pat. No. 4,218,834 of Hans R. Robertson granted Aug. 26, 1980, the entire disclosure of which is hereby incorporated by reference. The shooter laser scanner transmitter 28 transmits full shooter data in on-target beam dwell time including the TP time, shooter ID, weapon type, ammo type, gun tilt and twist angles, GPS (x,y,z) data, GPS (Vx, Vy, Vz) data, Met data (optional), etc. The data that is optically transmitted is decoded by the electronics in the target tank 14 which are the same as those in the shooter tank 10 and illustrated in FIG. 2. The target tank 14 determines the target AZ and target super EL with resect to the shooter's boresight, either by 1) knowing the trigger pull time and scan rate or 2) decoding the transmitted scan angular position data. Range to the target is determined by comparing the shooter and target GPS coordinates. The orientation of the entire shooter/target geometry with respect to

gravity is determined from the DGPS or tilt and twist sensors 72, 74 and 76. The system control unit 42 of the target tank 14 runs a ballistic simulation using the data transmitted optically from the shooter tank 10. It derives the AZ and super EL from the boresight via scan timing or data. The target tank 14 tracks its own motion during fly-out via DGPS and carrier phase. From all of this information, the system control unit 42 of the target tank 14 determines the impact point of the imaginary projectile. If a miss is determined, the weapon/target perigee is determined instead. The crew of the target tank 14 is informed of the results of the enemy fire preferably by intercom and collateral damage is simulated. If a hit is determined, the shot aspect angle is calculated from the detectors and turret encoder data. The system control unit 42 then performs a casualty assessment in accordance with the impact coordinates, range, shot aspect angle, known weapon/target vulnerability data and so forth. The system control unit 42 then notifies the shooter tank 10 via the kill strobe 46 and the RF data link. Pk, range and hit coordinates are displayed on a display 86 (FIG. 2) in the shooter tank's crew cabin (column 3 lines 63-67 to column 5 lines 1-10). Therefore, Varshneya discloses a hit simulation system comprising a receiver configured to receive the transmitted electromagnetic waves from the weapon and a processor configured to determine whether a target has been hit based on the information related to coordinates in the three-dimensional space for the calculated ammunition trajectory in the received electromagnetic waves on both the shooter and the target unit.

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALVIN L. CARLOS whose telephone number is (571)270-3077. The examiner can normally be reached on 7:30am-5:00pm EST Mon-Fri (alternate Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xuan Thai can be reached on (571)272-7147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cameron Saadat/
Primary Examiner, Art Unit 3715

/Alvin L Carlos/
Examiner, Art Unit 3715
January 14, 2010